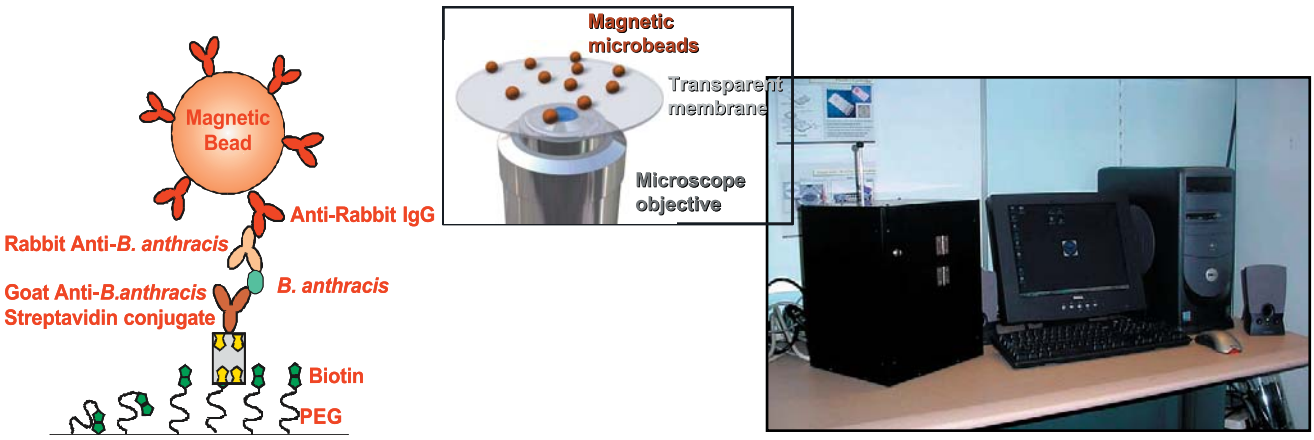
Immunobead Force Discrimination Biosensor (FDB)



DESCRIPTION:

The Naval Research Laboratory (NRL) has developed several revolutionary biosensor systems using magnetic microbeads to probe for target biomolecules (proteins or nucleic acids) specifically bound to receptor-patterned surfaces. The microbeads serve both as reporter labels and as force transducers to allow "force discrimination" – a technique developed at NRL that greatly reduces the background signal – enabling the identification of single biomolecular ligand-receptor interactions with high sensitivity and specificity. Assays using magnetic labeling and force discrimination have been developed for a variety of bacteria, viruses, protein toxins, and DNA sequences, including those specific to biological warfare agents.

The Force Discrimination Biosensor (FDB) is based on an advanced magnetic bead immunoassay that has sensitivity up to 1000 times higher than other immunoassays. The concentration of the analyte is determined by optically monitoring the position and number of beads on a transparent substrate. For beads with an approximate diameter of 1 μm, optical microscopy can be used for simple, rapid bead counting. The assay is performed in an indirect sandwich format as shown above.

ADVANTAGES/FEATURES:

- **Sensitivity:** 1000 times more sensitive than other immunoassays
- **Specificity:** Greater than 99% specificity
- **Speed:** Assay time less than 20 minutes
- **Analytes:** Demonstrated assays for
  - **proteins**: SEB (1 pg/ml), Ovalbumin (10 pg/ml), Ricin (100 pg/ml)
  - **bacteria**: *Bacillus globigili* (300 cfu/ml), *Bacillus anthracis* (10^3 cfu/ml), *Francisella tularensis* (10^4 cfu/ml), *Erwinia herbicola* (10^4 cfu/ml)
  - **viruses**: MS2 (10^3 pfu/ml)
- Licensable under U.S. Patents 6,086,821; 6,181,418; 6,676,904; and 6,764,860
- Patent pending: Patent application 10/457705; Navy case 84,529

APPLICATIONS:

- Healthcare, including clinical diagnostics
- Agricultural testing, including veterinary diagnostics
- Environmental monitoring, including food and water testing
- Forensics

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